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# The Automobile

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THE FOSTER STEAM AUTOMOBILE.

### The Foster Steam Automobile.

The Foster steam stanhope is one of the latest automobiles that has been placed on the market. Its builders, Foster & Co., of Rochester, N. Y., report that thorough tests have been made of the vehicle, so that they guarantee with confidence each vehicle sent out.

The style of carriage has been greatly admired on account of the neat outlines and light appearance. The running gear is steel tubing, well braced and supporting the carriage body on three elliptical springs. The wheels are either steel wire, 34 and 36 inches in diameter, with pneumatic tires, or a very neat looking wooden wheel with solid rubber tires. The seat for two persons is heavily upholstered, and a top is furnished when desired.

The reservoirs for supplies and driving mechanism are concealed by carriage body. The rear axle is divided and a differential gear is used. The circumference of the central ring carries a row of sprockets on which the driving chain runs. On the side of this there is a broad pulley on which the band brake acts. The chain runs over the sprocket on crank shaft and the rod from band brake to the pedal lever.

The water tank is of horse-shoe form, and surrounds the boiler, which is centrally located. It is built of copper, and holds fifteen gallons of water. The opening is at the rear, where it is handy for hose or pail, as circumstances require. The gasoline tank is placed beneath the forward part of the body. It is of cylindrical form, and holds six gallons or sufficient for a seventy-five mile run. An air reservoir, placed under the seat, is of sufficient size to exhaust the entire tank of gasoline when pumped to the normal pressure of thirty-five pounds. Thus when once filled needs no attention from user. The supply of gasoline to burner is controlled by valve which is easily accessible to driver and gives by adjustment the desired heat under the boiler.

**The Boiler.**—The important part of this class of automobile is the boiler and furnace, which must necessarily be quick steam raisers and able to respond quickly to any calls for power as our roads in this country demand. This boiler, which is of the vertical tubular pattern, is composed of a steel shell five-sixteenths inch thick, filled with two hundred quarter-inch copper tubes. The normal steam pressure is 160 pounds per square inch, and the boiler has been tested to more than double the pressure at which the pop safety valve is set.

The feed water is supplied from tank by a small cross head pump. The capacity of boiler is about six and a half gallons. The furnace or burner is of the atomizer pattern. It is started by using a long, narrow spoon, which holds a little waste saturated with gasoline or kerosene. This soon heats the burner, and it is claimed that six to eight minutes is sufficient time to get up steam from cold water ready to

start. When carriage is stopped and burner extinguished a pilot light burns so that the carriage is ready to move without the trouble of heating the burner. The fuel is in this manner economized.

The water gauge indicates at all times the height of water in boiler, and there are also three cocks on water column which gives a double test of the water in boiler. The steam gauge is on the dash in constant view. In a corresponding position the gauge indicating pressure on gasoline is placed.

**The Engine.**—From the steam dome the steam is led to an ordinary double slide valve engine. The cylinders have a diameter of two inches and a piston stroke of four and a half. The pistons are furnished with one ring and valves are fitted with large openings to insure the exhaust of all condensations should such occur. These are set to get economy in operation and builders are confident that seventy-five miles can be made on fifty cents worth of gasoline. The crank shaft is made of forged steel and is set in ball bearings.

The engine will develop from six to seven horse-power, but on ordinary roads but two and a half is required. In lubricating the various bearings ample provision has been made. It is said to be able to mount a fifteen per cent. grade.

**Operation.**—The speed is controlled entirely by the link and throttle. Two levers are placed at the right hand of the driver for this purpose. The engine, it is claimed, will run on the shortest point of cut-off of any in use. In a backward movement of the automobile the same changes in speed are available as in the forward movement. The supply of fuel to burner and water to boiler are under the care of the operator. The steering is effected by the style of lever which seems to be most popular in this country. It is hinged so as to permit of a vertical movement.

The weight of this automobile ready for the road is about seven hundred pounds, and sells for one thousand dollars.

### Why Motor Carriages Were Not a Success in 1833.

By W. E. Partridge.

The Louisville "Courier-Journal" recently published an editorial on the subject of Automobiles vs. Street Railways. One of its paragraphs deserves special attention:

Motor wagons and carriages were used with a fair degree of success as far back as 1833, and it would seem should have been developed into a form practicable for daily use by this time if there were not some insuperable obstacles in the way. At the time of their invention and first trials, Stephenson had just brought out his locomotive, which offered infinitely greater attractions in a commercial way, as its speed development showed, while motor carriages were neglected. Some of these old machines were driven by steam, and all appear to have done fairly well, but they did not interest capital.

This gives expression to a generally prevailing feeling, but it makes a statement which is absolutely untrue. Hancock,

Guerney, Church and a half a dozen others had successful lines of steam coaches, running out of London, at an early date, and the trouble was not so much to get capital interested in the steam coaches as it was to prevail upon Parliament to sanction railways at all. Stephenson discovered very soon in his effort to obtain charters for his railways that the success of the steam coach was fatal to the railway. These coaches had been running and were a commercial success. With a business ability that we must admire in spite of its duplicity he began to stir up the coaching and the turn-pike interests. He assured the turn-pike people that the steam coach was likely to ruin the coaches drawn by horses, that the farming interest would thereby be greatly injured. He appealed to the coaching interest in the same way, and by combining the two forces succeeded in getting a bill through Parliament which permitted the turn-pike people to collect a shilling a head for each passenger on a steam coach at each toll gate. The turn-pike people previous to this time had succeeded in stopping several lines of coaches by putting fresh metal upon their roads to the extent of 15 ins. to 18 ins., thus making the roads practically impassable. The turn-pike bill stopped the coaches, and in the following year Stephenson had no difficulty in getting his charters through Parliament. This history ought to be better known than it is, as it would stop such foolish statements as those made by the "Courier-Journal." It is interesting to note that as long ago as the early '30s a steam coach in England ran 90 miles in three hours, and on another occasion made 35 miles in a single hour.

### Rules in Brookline, Mass.

The selectmen of the town of Brookline recently passed the following rules governing the use of automobiles:

1. No automobile used wholly or in part in the town of Brookline shall be run within the limits of said town at a rate of speed to exceed ten miles per hour.
2. Every public automobile used either wholly or in part in the town of Brookline shall bear the number of its license in a conspicuous place in the rear of the carriage in figures in Arabic characters, not less than two inches high.
3. Every person in charge of an automobile waiting for passengers in any street, square or public place in Brookline shall obey the directions of any police officer respecting the place of standing, and the route to be taken when going to or leaving such place.
4. The owners and persons having charge of an automobile used in violation of any of the foregoing regulations shall forfeit and pay for each offence a fine not exceeding twenty dollars.

The date of the Paris-Bordeaux race, in which a great deal of interest is being taken, is May 23d.



**Electric Vehicle Driving Mechanism.**

By Wm. H. Chapman.

In driving four-wheel vehicles by any motive power, one or the other of two distinct plans must be adopted. Either two independent motors, one for each driving wheel, must be used, or else one motor and a differential gear to apply power equally to the driving wheels and at the same time allow one wheel to run faster than the other in rounding curves. The latter plan has some very decided advantages in the simplification of the driving machinery, and in the higher efficiency obtained by the use of one motor of double capacity.

It is a common practice to place the dif-

ferential gear on the axle of the vehicle so that the speed of the gear is the same as that of the driving wheels. This would be only 180 revolutions per minute, on a vehicle having 28-inch wheels, going 15 miles per hour. There is no reason, however, for confining a differential gear to such slow speeds, and since electric motors involve quick speeds it is good engineering to place the differential gear on some quicker moving part of the mechanism and so proportionately reduce its weight for a given power transmitted. The special advantages of this plan is that the driving machinery can be compactly built in one framework where all parts will be held in perfect alignment not subject to the racking of the vehicle on rough roads. The machinery as a whole is then easily

attachable to or removable from the vehicle. Fig. 1 shows a vehicle that has a one-horse-power motor outfit. The total weight of this vehicle, including the storage batteries to run it a distance of 20 miles, is 480 pounds. Fig. 3 shows the motor mounted in its frame, together with intermediate shafts and driving sprockets. The motor and gears are enclosed in waterproof and dust-proof casings. Fig. 2 shows the same with the gear case open. Inside of the case is a six-inch gear with 72 teeth, which engages with a pinion on the armature shaft having 12 teeth. In the web of this gear there are two small miter gears running loosely on studs set radially. These two miter gears engage with two

latter arrangement is a decided advantage when running in hilly regions, although it somewhat complicates the motor windings and controller connections.

The controller is placed just forward of the seat and the batteries under the seat. The use of the motor as a generator provides an excellent coasting brake, and in practice the mechanical brake is seldom used, although one is provided and applied to a brake wheel on the armature shaft, where it is most effective. The gear case is kept partly filled with lard oil, which keeps the gears and bearings perfectly lubricated. These motor outfits are easily applied to any style of vehicle, and are attached in the manner of a car motor suspension with swivel and spring. They are being manufactured in three sizes, one, two and three horse-power, by me at Portland, Me.

**A Comparison of Automobiles.**

In a recent lecture on "The Development of the Automobile," before the Electrical Engineering Section of the American Institute, Mr. R. E. Fless stated that the automobile of to-day was divided into three classes—those propelled by steam, electricity and petroleum. Each class has good points. The best record for speed is credited to the electric style, which has made a speed for a short distance of 63 miles an hour.

As a matter of record, the electric machine has proved to be best for city streets and over level roads; for short distances the petroleum or gasoline motor is best for ordinary runs in the country where there is some uneven ground to be covered; while steam is the choice where heavy work is to be done.

The automobile first came into prominence in France in 1894, during which year the first race was run. England became interested two years later, and the following year (1897) the "auto" was introduced in this country. Since that time it has made great strides.

The interest reached its zenith last year in both Europe and America. There are 7,000 owners of horseless vehicles in Europe to-day, 5,000 of whom are in France. In Paris alone there are 600 manufacturers and more than 900 dealers. In this country it is not so far advanced, although popular interest is increasing.

The lecturer enumerated among the advantages of automobiles that they occupy less space in front of a store in the shopping districts, and give more reliable service in heavy weather than can be attained in any other way.

**Racing Team.**

Messrs. C. S. Henshaw and Oscar Hedstrom, who have individually made records for themselves on the wheel, are to race together this year on a motor tandem. This motorcycle has a four-horse-power gasoline motor, and is credited with the ability to make a mile in 1:10.

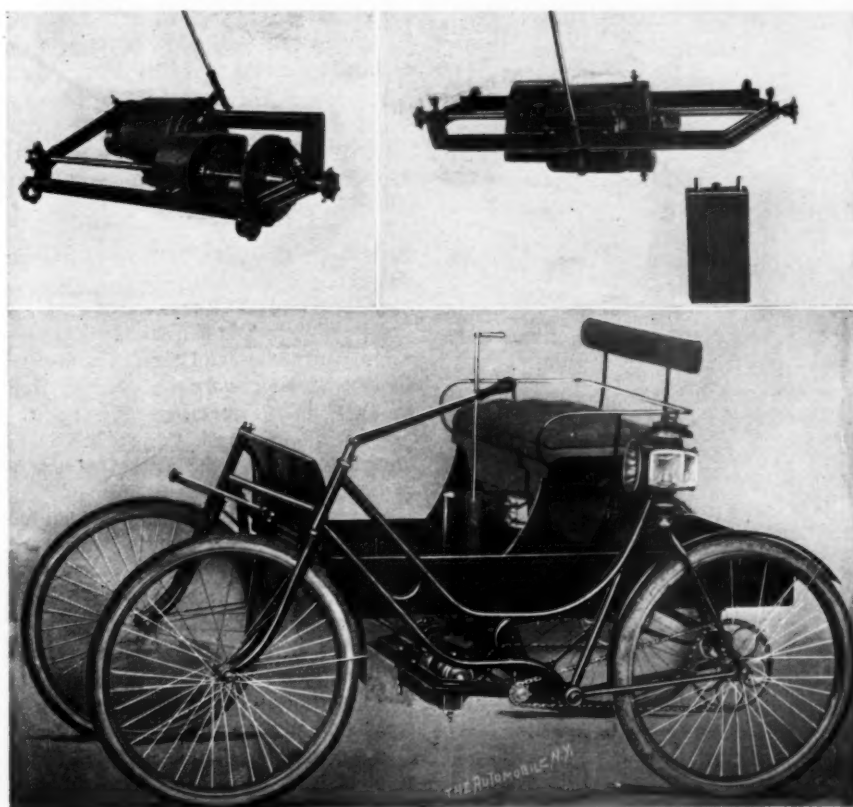


FIG. 1—AUTOMOBILE WITH CHAPMAN EQUIPMENT.

FIG. 2—CASE OPEN.

FIG. 3—CASE CLOSED AND CELL OF BATTERY.

ferential gear on the axle of the vehicle so that the speed of the gear is the same as that of the driving wheels. This would be only 180 revolutions per minute, on a vehicle having 28-inch wheels, going 15 miles per hour. There is no reason, however, for confining a differential gear to such slow speeds, and since electric motors involve quick speeds it is good engineering to place the differential gear on some quicker moving part of the mechanism and so proportionately reduce its weight for a given power transmitted. The special advantages of this plan is that the driving machinery can be compactly built in one framework where all parts will be held in perfect alignment not subject to the racking of the vehicle on rough roads. The machinery as a whole is then easily

other miter gears, which are keyed to two separate shafts whose ends butt together inside of the hub of the six-inch gear, which turns loosely upon them.

The two shafts have sprocket wheels at their outer ends, which are connected by chains to sprocket wheels on the two rear wheels of the vehicle, and thus the two wheels are driven positively in direction and power and yet independently as regards speed. The motor is series wound, and has three speeds, which are obtained by multiple and series connection of the field coils of the motor and by multiple and series connection of the battery cells. One notch is arranged in the controller where the motor acts as a generator and sends its current either through a resistance or else back into the batteries. This

## Club News and Views.

### The International Automobile Congress.

Plans for the Automobile Congress that is to be held this year during the Paris Exposition are being rapidly perfected under the direction of M. Jeantaud. The date of its opening has been fixed for July 9th. The place of meeting will be the main hall of the Palais des Congres, except for the conferences and minor sessions, which will be held at the home of the Automobile Club of France.

The members of this congress will be those who shall send to the commissioner of organization their application before the opening of the congress, or who shall register during the session of the congress and shall have paid the apportioned contribution. To the first the sum of 20 francs has been apportioned and to the latter not less than 100 francs. Each member will receive a personal ticket that will admit him to the exposition, to the Automobile Club of France and to such gatherings as may be held during the week of this congress.

The congress contemplates public sessions, general sessions, meetings of sections and conferences, visits to manufacturing establishments, rides, etc. Papers for discussion must be sent to the above-mentioned officer before the first of May. The minutes of the proceedings are to be printed and distributed at the close of the congress.

The president of the congress is M. Michel Levy, a prominent engineer and an honorary member of the Automobile Club of France. The vice-presidents are MM. le comte de Dion, president of the Chambre Syndicate de l'Automobile, vice-president of the A. C. of F., and G. Forestier, professor at l'Ecole des Ponts et Chaussées. The general secretary is M. le comte de Chesseloup-Laubat and secretary M. Rene Varennes.

### At the Paris Exposition.

The automobile events in connection with the Paris Exposition are being rapidly organized. The program for the international competitive tests and races to be held at Vincennes Park, has recently been decided upon by the Automobile Club of France. There will be six principal events, one being held every month, lasting for five days. The first of these will be a competitive test of touring vehicles, commencing May 14, including automobiles of 2, 4, 6 or more places. This will be followed by a test of cabs for city service, on June 18. A series of races at high speed will be held, commencing July 23; this includes three classes, large and small automobiles, and motor-cycles. On the 13th of August, the small vehicles of two places, breaks, phaetons, etc., will be represented;

on the 17th of September, light delivery wagons. The last of the tests will be held October 8-13, and will include heavy vehicles of all descriptions for the transportation of freight and passengers. A space has been set apart in the park for each of the two main classes, bicycles and automobiles, the latter including motor-cycles. Each of the sections will be provided with a race-track. A charging station is to be erected for the accumulators of the automobiles, besides supplies of gasoline, oils, pneumatic tires, etc. Sheds are to be provided with facilities for cleaning the vehicles when they leave the race-track before entering the exhibition hall. This program will afford some of the most interesting entertainments at the great show.

### British Automobile Club Regulations.

The Automobile Club of Great Britain and Ireland has adopted strict regulations concerning its badge, to keep it from being



M. LENOIR

INVENTOR OF THE GAS ENGINE AND BUILDER OF THE FIRST GAS AUTOMOBILE.

used to further commercial schemes. The badge may not be worn or displayed in any place of business. Its design may not be painted upon any except a private car which is not used in connection with business. It must not be displayed by a member when riding on a motor vehicle which bears any commercial inscription or device. It must not be worn by a member when he is engaged in any affair pertaining to automobiles. In accepting badges the members are required to sign an agreement to abide by all these rules, and a violation invites forfeiture of the badge as a penalty.

### The International Race.

The national clubs of America, Belgium, Germany, and Italy have deposited a forfeit with the Automobile Club of France

which now holds the Gordon Bennett cup. These five clubs will be the competitors for the cup next June, unless they should elect another club, which is not probable. It has been suggested that each club select a color, and that the automobiles of that club be finished entirely in that color. This would enable every one who witnesses the race to distinguish immediately the nationality of the automobile. The rules of the race require that the automobiles entered by a club be entirely of home manufacture. This fact makes the race not only between drivers from different nations, but also between automobiles of different nationalities.

### Applicants for Licenses.

The first applicants for licenses to operate automobiles in Chicago have been examined and licenses granted. Among the questions asked were the following:

What is the character of power used to propel the vehicle you wish to operate?

What is the approximate weight of the vehicle?

How many persons is it designed to carry?

Is it to be used for private, public or business purposes?

What speed is it capable of making on ordinary streets in Chicago?

Do you understand the law and responsibility which govern operating a vehicle on the public streets?

What experience have you had in operating a vehicle of the class you now wish to operate?

Has an accident ever been caused by the vehicle you were operating? If so, state the circumstances.

If the vehicle you wish to operate is traveling at the speed allowed by the ordinance, in how short a distance could you stop it?

What precautions would you take when approaching a crowded crossing?

What parts of the vehicle do you consider should be carefully and frequently inspected?

What precautions would you take when leaving the vehicle on the street without an attendant?

State how you would start the vehicle.

State how you would make an emergency stop.

How is the brake applied to the vehicle?

How would you reverse direction or cause the vehicle to go backward?

By what means can you tell when the supply of power for the vehicle is nearly exhausted?

Do you agree that in event of an accident in which the vehicle you are operating is concerned you will report the circumstances in writing to the board of examiners within twenty-four hours of the occurrence?

The applicant must also demonstrate his ability to operate his automobile by running it before a member of the examining board.



**The Phoenix Automobile.**

An automobile delivery of a very substantial type is shown herewith. It is a product of the Phoenix Motor Vehicle Co., of Cleveland, O. The design of the carriage, as a whole, is very neat and shows

was cut out of circuit. After four failures of this kind this battery was excluded from further competition.

For the remaining five days of each six the batteries were subjected to a shaking motion in imitation of the movement of a

ing to that furnished on discharge; conditions of keeping in order, necessity of repairs, etc., and weight of accumulators as compared with their capacity. These tests commenced June 2d, 1899, and closed December 3d.



THE PHOENIX AUTOMOBILE DELIVERY.

serviceability. The finish is of the best, and it is a very attractive vehicle on the street.

The carrying capacity of the wagon is one thousand pounds, and for this a very large space is provided. Back of the seat there is an available space 40 inches wide, 60 inches long and 45 inches high. Wood wheels are used unless otherwise specified.

The motive power is a two-cylinder tandem, gasoline engine. Supplies are carried for a long run. Speed up to sixteen miles an hour with full load is obtainable, and two variations forward and one speed backwards are at the command of the driver. This is one of several styles of automobiles being built by this company.

**A Six Months' Test.**

The test of storage batteries made at the Automobile Club of France, which were continued for a period of six months, did not prove as successful as had been hoped. The complete report of the engineers, having the matter in charge, has not been made, but it is stated that of the eighteen different batteries entered but eight survived, and these not in the most satisfactory condition.

The arrangements for the tests were most carefully made, and the records kept to the most minute detail. The tests were made in periods of six days. The first day the batteries were charged and then discharged in series at the constant rate of 24 amperes for five hours. If the voltmeter readings fell below 8.5 the battery

carriage and discharged at a variable rate. During the tests the shaking apparatus broke down and was discontinued toward the last of the tests. When at rest owners of the batteries were permitted to clean plates and correct the specific gravity of



ST. LOUIS RUNABOUT.

the electrolyte, but repairs of any other nature were not permitted.

The following were carefully noted during the continuance of the test: The duration of the elements; their efficiency, or the relation of the energy given in charg-

**St. Louis Runabout.**

The runabout shown herewith is propelled by a gasoline motor. It is simple in construction and has been devised with a view of making it easy of control and operation. It is especially suited to the needs of the physician, a drummer, or any one who wants a serviceable and good riding automobile.

It is said a gallon of gasoline will run it twenty-five miles. The motor with which it is equipped is a single cylinder of five horse-power capacity. The gears are cut from solid steel and run in oil. The motive machinery is nearly all mounted near the rear axle, so that the weight comes on the driving wheels. Steering is by means of the forward wheels in the usual manner.

The wheels are 34 inch, with ball bearings, and the one piece rear axle is also mounted in ball bearings. The wheels and tires are fitted to suit the wishes of the purchaser. The tire may be a three-inch pneumatic or an inch and three quarters solid rubber. The upholstered parts are covered with leather, and a top and apron are furnished when desired, and also the lamps as shown. These are acetylene.

There is also provided such tools as may be necessary to keep the nuts and bolts tight and bearings well lubricated. There is an electric alarm bell. The powerful motor with which this carriage is equipped

will take it up a 20 per cent. grade on the small gear, but lighter grades can be made at full speed. The gasoline tank will hold enough to carry it one hundred miles, and if so desired a larger tank sufficient for two hundred miles will be fitted to the vehicle.

# The Automobile

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The Motor Vehicle Users' Defence Ass'n is the name of an association of British automobilists. It is intended for the mutual protection of its members. Should an action be brought against a member relative to his automobile he is permitted to call on the association to take up his defence.

## Coverings for Driving Mechanism

It has been many times commented on that automobile builders, of the steam type, especially, leave the working parts of their automobiles too much exposed to the dust and mud of the road. There must necessarily be a considerable amount of oil used on the different wearing surfaces, and in the rapid motion of the vehicle it will not remain on the place for which it is intended. Aside from cutting the moving parts, the trouble of cleaning this oil and dust from the vehicle is no small matter. It is not always possible for an automobile to be cleaned on its return from a trip, and if not done every trip the carriage is in poor condition for service, and in a few months will be in no condition at all. The expense of covering the driving mechanism is but a small item. While the owner can have it done, it is reasonable to think that at the factory of the builder the covering could be devised and furnished to better advantage.

## Motor Cycles.

It is the opinion of many persons well acquainted with the history of cycling and of the automobile that the most popular motor vehicle, as to numbers, at least, is to be a light form of motor cycle, propelled by a gasoline motor. For a two-wheeler the weight will be about 65 pounds, for a tricycle 150 and a quadricycle 250 pounds. There is already on the market a line of the first, which sells for \$190, and those of the second and third class now on the market are imitations of foreign products and sell for \$450 up.

There are a large number of engineers now at work on this class of vehicles. Their work is necessarily slow, as there are many patents already granted on the parts that make up such vehicles, and new devices must be thoroughly tested before the patterns and machines are made for turning out large numbers in accordance with American ideas of manufacture. Several are promised in a few months, and before the riding season closes next fall we will undoubtedly see large numbers in use.

## Lightness in Construction.

One aim of all builders of automobiles is to secure lightness without sacrificing strength. Of all metals aluminum possesses this quality of lightness in the highest degree, while still possessing to a considerable degree other qualities. Its tensile strength is about the same as cast iron; is very malleable and can be cast or rolled. Its hardness can be increased by the addition of a small percentage of copper, and when alloyed with other metals other qualities are improved. The weight of a given volume is only one-third of the same volume of steel, and copper is nearly four times as heavy. It does not easily tarnish and is not acted upon by sulphur and other elements of the atmosphere. Its cost has been wonderfully reduced since the metal was first introduced, and it is being more

extensively used every year. Automobile builders are using this metal to good advantage and especially for coverings. In one or two instances builders have discarded wood altogether and used aluminum for the construction of the body. On motor cycles, coverings for gears, rods for controlling and various attachments are made of aluminum.

## Guaranteeing Automobiles.

A custom which has long been prevalent in a number of other industries is bound soon to appear in the automobile industries. Some companies are already giving a guarantee with each automobile. Purchasers will shortly demand such guarantees, and it is well for builders to prepare for it. The matter of a guarantee has really more weight with the general public than with an expert in the particular line. A purchaser, unacquainted with the manufacture of the thing purchased, and therefore unable to judge of the excellence of the article, is, as a general thing, unwilling to accept it without the written assurance of the builder to replace all structural defects appearing within a prescribed time. Sewing machines, bicycles and a long list of appliances have been sold for years accompanied by the maker's guarantee. In the bicycle business, in some lines, the guarantee makes a difference of several dollars in the price, a guaranteed wheel at a certain price and one not guaranteed at a lower figure. As a general rule the higher price is paid. The builder with an established reputation or desiring to establish a reputation for fair dealing places only such goods on the market as he is willing to guarantee, and replaces broken parts uncomplainingly. The automobile builder has the same problem before him and will have to handle it as others have handled it heretofore.

## Light Locomotive Privileges

A contemporary devoted to the steam railroad asks this question in a recent editorial:

"If railway trains, running on a fixed and narrow path, with warning bell and steam puff, across streets guarded by gates and watchmen, and along their own right of way, fenced against trespassers, are considered dangerous, what shall be done with the fierce motors possessing the freedom of the streets, from curb to curb, that are soon vastly to outnumber the locomotives?"

It is but natural that steam roads should feel the great expense imposed upon them for elevated tracks and crossings to be a burden. It is also but natural that they should be jealous of their rivals and seek to turn the attention of the public away from themselves. The privileges of the electric roads, which are sharp competitors in many places, are still thorns to their flesh. These interests are too strong to be downed as the automobile was in the early years of the present century. The automo-



bile at the present time is not in the least a rival of the steam roads. What it may become in the future, time alone will tell. As to the real dangers of the automobile on our streets, there is no comparison between it and the locomotive. Statistics that are carefully kept by a French journal do not show that self-propelled vehicles cause more injuries, proportionately, than horse-drawn vehicles, although the speed allowed is much greater. The facility with which it can be guided and the quickness or short distance in which it can be stopped are advantages that make it the safest of vehicles for our streets.

#### **Belt Driving for Automobiles.**

One of the most conspicuous imperfections of many of the foreign automobiles is the use of belt driving. In this age of direct-connected machines and electric transmission of power, the belt is a little out of date, according to American ideas. The belt has rendered a noble service, but its imperfections are numerous. Other methods of transmitting power have proved so far superior that it would seem very strange for an American to find a belt on his automobile. The bicycle affords an excellent example of methods of transmitting power, the chain and the shaft and pinions. Either of these methods possess great advantages over the belt. On the automobile the belt is necessarily placed low in the running gear. It is therefore subjected to all the vicissitudes of weather and road conditions. Owners of such automobiles state that the belts slip worse in dry, dusty weather than in wet, and that the best results have been obtained with clean belts, a conclusion reached after trying resin and numerous compounds. The belt and pulleys must occupy more room and must be as expensive as other devices.

#### **Millions in Subsidies.**

Under what is termed the River and Harbor bill there is annually appropriated a sum amounting to many millions of dollars, which is expended along the coasts and waterways of our country. Last month there was introduced the Hanna-Payne bill calling for nine million more for the shipping interests. From the beginning of our history these interests have been nursed and fostered by congress. Unlimited funds are had for the asking, while the great interior of our country receives no attention from the national government. The citizens of the interior can travel the green soil in its original state or he can build bridges and highways at his own expense. Districts, townships and counties have grappled the road problem as individuals, and not always with the most patriotic motives. The attempts at road engineering have been spasmodic and of the crudest order. The system of road maintenance whereby each taxpayer of a district does his proportionate share of work on the road, will never prove economical nor bring about the most permanent form of highway. Main roads connect-

ing the large cities of our country would not only prove of great advantage as highways but could also be made of great benefit as examples of the best form of roads. Such roads would not lie within the domain of any one state and therefore could be taken up by the general government.

#### **Automobile Racing.**

That automobile racing shall prove at some, not very distant, day as attractive in America as it is at the present time across the Atlantic, is a safe prophecy. It is a sport to be cultivated, and when once it becomes the vogue it will have a wide interest. Fortunately, racing of this kind in France at once fell in good hands and has remained under auspices which have done the most for the sport. Its rules are everywhere recognized and the prestige established will help to encourage automobile racing throughout the world. The non-success of the L. A. W. to handle bicycle racing and its recent action in giving up entirely this branch of the sport is, of course, a warning to those undertaking the control of racing in the automobile line, but the wonderful success of the Automobile Club of France stands forth so prominently that any number of failures can not overshadow it. The conditions are not so favorable for automobile racing in this country as abroad. A broad, smooth road is necessary, and not always available. The automobile is one of the influences that is to broaden and smooth our roads.

#### **Fuel for Automobiles.**

It is quite evident that new ordinances and new laws are necessary to permit the handling and sale of gasoline for steam and gasoline motor vehicles. At the present time, petrol in small cans can be obtained in every French village. The automobilists hand-book tells him where he can buy supplies, and he is never out of service for lack of petrol. A condition approaching this universal sale of supplies is to be found in Great Britain and neighboring countries. Gasoline can be obtained in nearly all small towns in this country, but it is usually of low test, and not always of the best quality. The only restrictions on it, aside from the State laws, are such as the insurance companies carrying the risk of the dealer impose. In the larger towns and cities more rigid ordinances govern its storage and sale. It is ever a question, whether an automobile owner does not violate the law, when he runs his automobile with storage tank filled with gasoline into his stable. It would seem that the best practice would be for the refiners to place on the market one and two gallon sealed cans of gasoline put up especially for the use of automobilists. These cans could then be kept without danger by supply dealers and the automobilist would know what he was buying. The laws should be changed, where they now prohibit this, so as to permit this to be done. The hotel-keeper could furnish the can of gasoline where he has previ-

ously furnished the feed of oats. The sealed can prevents the deterioration of its contents and guards against the accumulation of the gasoline vapors about the can which become so dangerous when mixed with air. They should, however, be stored in the open, with only a roof as there is always a liability of leaks to occur. Since this is a matter in which the individual city or town has jurisdiction it will be necessary for automobilists to become familiar with the rules of the places through which they travel.

#### **A Show in the Fall.**

The suggestion of our contemporary, the "Electrical Review," for an exclusive automobile show at which the stationary exhibit shall be placed in the basement and the main floor used for obstacle races, speed trials and other contests, is a good one. It has been our aim in these columns to point out the defects of the posed display of the automobile and the advantages of the moving exhibit. The above suggestion for a show fills these conditions and at the same time gives an opportunity for the display of automobiles, parts and accessories, which are a necessary accompaniment of such an exhibit. The time of year is also auspicious, and just before the horse show an advantage. Many companies, whose vehicles are now in the experimental stage, will probably have by that time well tried automobiles for exhibition. Let it also, by all means, be an exclusive automobile show. The automobile is able to stand alone, and should be given the privilege. It should not be made a drawing card for a show of some declining industry.

#### **Monuments.**

Our correspondent expresses a valuable sentiment who last month said: "The roads and streets over the country generally are a disgrace, being the arteries of business and the foundation of the life of the business interests. I would favor putting less money in public buildings, such as court houses, churches, parks, senseless monuments, and build good roads. After that other things might follow, but good roads first, and good roads all the time." What better monument could any man have than a few miles of well-constructed roads? There would be no finer nor more beneficial investment than a boulevard reaching out from some city or town. It would be as lasting as any monument and afford to the community a more lasting benefit. Fine buildings are no greater attraction and no more useful. A magnificent court house is less magnificent when surrounded by impassable roads. The lack of harmony creates displeasure where the contrary should arise. A boulevard is but an elongated park, giving pleasure to all who can reach it. It makes travel a delight and drives away care and fatigue. When the fashion in monuments changes and the good road receives bequests then the automobile age will be in full swing.

### Some Tests of the Locomobile.\*

By J. A. Kingman.

This test was made at Newton, Mass., for the purpose of determining the amount of water evaporated per hour per pound of gasoline fuel.

The boiler was balanced on scales and a safe quantity of water kept in the same during test.

Exhaust steam discharged through a valve at 160 pounds pressure.

Temperature of feed water 60 degrees.

Gauge pressure constant at 160 pounds.

Air pressure on gasoline 35 pounds.

In one hour 160 pounds of water were evaporated. This was at the rate of 13 pounds of water evaporated per pound of gasoline fuel. These results agree closely with those obtained by operating the carriage.

The following letter gives an idea of the great strength of this admirable boiler: Newton, Mass., Dec. 8, 1899.

S. T. Davis, Jr., New York City:

Dear Sir.—We made the first attempt to-day to explode one of our boilers. It was not very successful so far as the explosion of the boiler was concerned, but very satisfactory on the whole. We took one of our regular boilers, attached the burner, the gasoline tank with about two quarts of gasoline, filled the boiler with water to within two inches of the top, and started the burner without any automatic or safety valves.

The boiler was absolutely tight until the pressure reached between 700 and 800 pounds. Then it began to leak slightly around the seams of the edge of the boiler at both ends. The leaking increased until the pressure had reached 1,225 pounds, when it was so great that no higher pressure could be produced. There was at the time 35 pounds pressure on the gasoline, and the fire working in perfect manner.

After letting it stand for some time in this condition we finally opened a valve and let the pressure down to about 500 pounds, and then shut off the fire, cooled the boiler, took it up in the boiler room and put cold water on it, and found that it leaked but very slightly around a few of the tubes, but very little with 500 pounds pressure in the seams at the ends. It took but a few minutes to make it absolutely tight, and the boiler is uninjured.

We are going to try the experiment once more with a boiler that is tight around the seams, and see if we can explode it. But our experiment to-day illustrated what my brother and I have always contended, and that is that you cannot explode this boiler with the small amount of flame that you can produce with our regular burner. That is, there will be leakage somewhere sufficient to relieve the boiler before it reaches a sufficiently high pressure to make it even dangerous. But 1,225 pounds is a pretty good pressure on a steam boiler, and we know that ours will stand that.

I thought you would be interested to know these facts. Yours truly,

F. E. STANLEY.

Hill Climbing.—This steam "Locomobile" has been put to some very interesting tests. The first public trial was held at Mechanics' Fair, Charles River Park,

in Boston, 1898. Mr. Stanley was not regularly entered in the competition, but brought his carriage to the park, and it took part in a number of the tests; the most striking of which was the test to show the hill-climbing powers of the different carriages. An incline was constructed running about 40 ft. in the air, consisting of different grades, beginning with a 5 per cent. and ending with a 35 per cent. grade. When other vehicles present had been tested on this grade and all of them had failed to make the summit, Mr. Stanley made an attempt and the carriage shot up the incline with great speed and bumped into the railing at the top. Mr. Stanley involuntarily shut the throttle valve, and the carriage rolled back as if falling vertically. Opening the valve again the carriage was stopped in the middle of the 35 per cent. grade; started again and taken to the top. The tests at Charles River Park were very interesting, and it is to be regretted that similar trials have not taken place.

Mountain Climbing.—Mr. Stanley ran a carriage from Newton, Mass., to the top of Mt. Washington. The "Locomobile" that he intended to take was not ready, and another one was selected. The run from Newton to the foot of Mount Washington was made at the average speed of 14 1-10 mile per hour, a large portion of the trip being made in a mountainous country. The ascent of Mount Washington was made in 2 hours and 10 minutes; this time included delay in filling the water tank. The lift is about 5,000 feet, and the distance covered, 52,800 feet at an average grade of about 12 per cent. Assuming the weight of the vehicle loaded to be about 880 pounds, and allowing 20 lbs. for traction, we can estimate the horsepower developed at the rim of the driving wheels. Now the weight lifted is 12 per cent. of 880 or 102 6-10 lbs., and adding 20 lbs. for traction, we have 122 6-10 lbs. Allowing 15 minutes for stops the running time amounts to 115 minutes, and the horsepower developed equals 122.06 times 528,000 divided by 115 times 33,000, equals 1 7-10 horsepower. Mr. Stanley was unfamiliar with the road and undoubtedly could make better time on a second trip. The descent of Mount Washington was made in about an hour with great ease.

Economy.—Mr. Stanley continuing his trip ran across the country to Lewiston, Maine; from Lewiston to the town of Caribassett, Maine, and from here back to Newton, making a run of 780 miles at a cost for fuel of \$6.25. The cost of gasoline was from 10 to 25 cents per gallon. No provision was made for a supply of oil, but no difficulty was experienced in buying gasoline in any of the towns in which he stopped. Mr. Stanley was accompanied by his wife. At the average railroad rate of 2 cents per mile the cost of this distance would have been \$31.00 for the two passengers.

One of these "Locomobiles" holding four persons was run from Newton to Newburyport and return, a distance of 110 miles. The amount of fuel consumed was 10 gallons gasoline at a total cost of \$1.10, or at the rate of one cent per mile. The distance was covered at the running rate of 19 miles per hour. This vehicle is unusual for the great amount of wheel base

as compared with the narrow tread; this admits of high speed with ease of steering.

Steam is indisputably the best power for heavy vehicles and several of our well-known scientists have made the unqualified statement that steam is the best power for automobiles. The elastic quality of steam renders it possible to develop great power in a short time. A very bad piece of road may be covered, a sharp incline may be ascended, or great speed developed instantly. This adaptability of the steam engine to all conditions is the most important advantage and must not be undervalued. Like the explosive engine, the steam carriage is a practically unlimited radius of action. Absolute safety may be assured. Excellent economy may be obtained, together with an entire freedom from objectionable features. The steam engine is so widely used and so well known that repairs may be made by any good mechanic. An engineer's knowledge is not necessary to operate a steam automobile. Common sense and familiarity with the working parts are necessary to the successful operation of any motor vehicle. It is not necessary to know more than this to successfully operate the steam automobile.

### Varying the Time of Ignition.

The employment of a hand-control for timing the ignition of engine on automobiles occupies much of the time of the driver. This provision enables the speed at which the engine obtains correct ignition and greatest proportional power to be varied. It is possible for a skilled driver to use such a device to advantage, but continual attention is required, and any incorrect adjustment produces unsatisfactory results. The tendency is for the efficiency and maximum output of the engine to be less than it should be, because in practice slightly late ignition occurs.

The reason for this is to be found in the fact that, with a given time of ignition, a certain speed secures correct ignition and most efficient working, but the power of each explosion is reduced at higher speeds owing to late and at lower speeds to early ignition. If, therefore, correct ignition was secured at a given moment—full power being used—and a slight increase in load occurred, then reduction of speed would result, accompanied by premature ignition and followed by less power and still earlier ignition. On the other hand, if somewhat late ignition was secured at that moment, then the increase in load would produce increase of power, and continue so to do until the reduction of engine speed caused correct ignition with maximum power of explosions.

The practical outcome of this hand control, when used by an unskilled driver, is that the automobile frequently comes to a dead stop on even comparatively slight inclines; for, although the driver may be well aware that the engine is losing speed, and that an adjustment of the ignition timing device is necessary, there is nothing to indicate to him whether earlier or later ignition is required, or to what extent such variation should be made.

\*Abstracts from paper read before the Automobile Club of America on Feb. 17th, 1900.



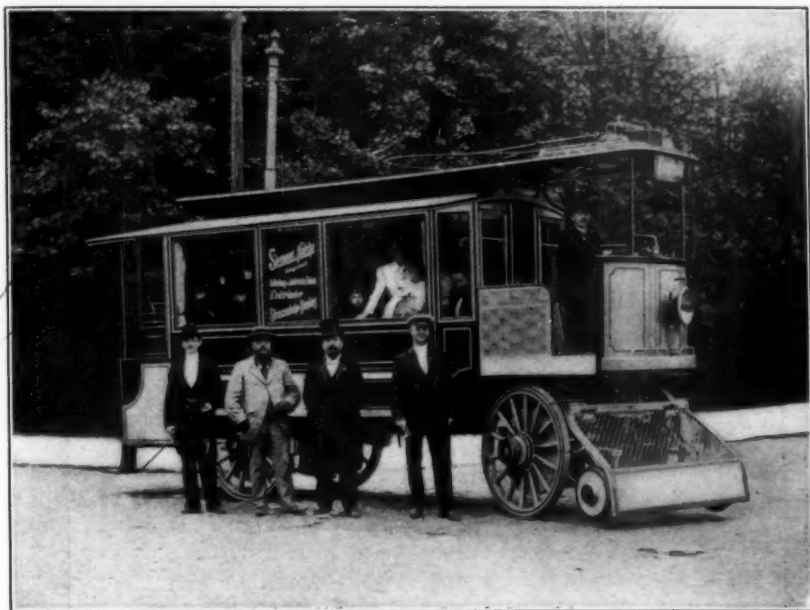
### A Combined Automobile and Trolley Car.

A novelty in the automobile line is illustrated in the accompanying cut. It is an automobile omnibus that can run by current from its own batteries or by current

which may justly claim to be the country of its origin, it is not making the progress that its friends would desire.

It is greatly to be hoped that any form of explosive-motor automobile ever gains ascendancy in the United States it will use

terial to a degree prohibiting its use except on a small scale and under particular circumstances. Crude alcohol of the ethyl variety may be made cheaply in the United States, but the internal revenue tax upon it amounts to \$2.14 per gallon.



A COMBINED AUTOMOBILE AND TROLLEY CAR.

taken from an overhead trolley. The batteries may also be charged from the trolley wire. Siemens & Halske Aktien-Gesellschaft, of Berlin, Germany, are the builders, and the omnibus is being used in that city.

As will be noticed, there is an extra pair of wheels just forward of the front driving wheels which act as guide wheels to keep the omnibus on the tracks when running as a trolley car. As soon as the omnibus leaves the track, these wheels are raised from the ground and the trolley is tied down. The steering gear is of the usual kind, but fitted with ball-bearings, and is capable of turning the omnibus in a very narrow street. The brakes are of the ordinary shoe variety, and in addition there is an electric emergency brake. Four motors are used, of four horse-power each. The total weight is about seven tons, of which the batteries are responsible for 3,300 pounds.

The chief value of this combined vehicle is that it can be used in connection with a street railway system for a route, a part of which runs through streets too narrow for street car tracks, or on which they may be prohibited for other reasons.

### Alcohol for Fuel in Russia.

In Moscow and St. Petersburg heavy automobile trucks carrying four or five tons are in constant use, says Dr. Benjamin in an interview published in the Electrical Review, and the fuel used is alcohol produced at a cost of about eight cents a gallon. The use of the automobile is rapidly spreading in Russia, while in France,

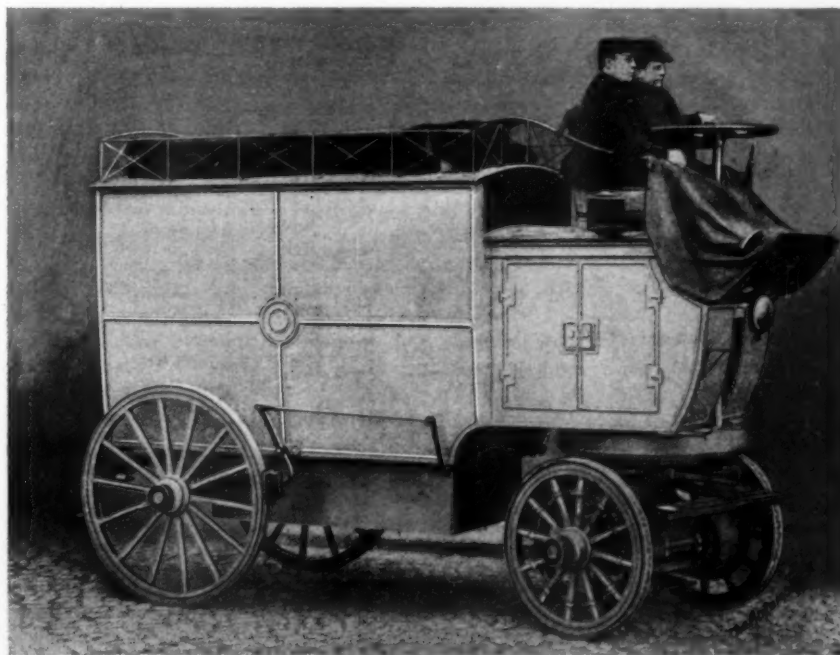
the alcohol fuel. Those who have been in Paris since the general use of the automobile in that city will probably at once recall two unpleasant memories—the tooting of the signal horns carried by the machines and the intolerable stench of the

### Automobile Tractors.

Regarding the use of automobiles for hauling boats on the Erie Canal, Mr. F. W. Hawley, the vice-president of a company which is promoting the scheme, says: Canals are by no means dead, and the future will show that freight can be carried on them more inexpensively than on railroads. Our corporation is organized for the purpose of propelling canal boats on the Erie, and to do this we will use an electric motor, something like an automobile. It should more properly be called a tractor. These tractors are guaranteed to haul six canal boats, of 240 tons each, five miles an hour. They will run on the towpath itself, and will not require that rails be laid. At present we are not in active operation, but are constructing these tractors in order to be ready on the opening of the canal next season.

### A German Mail Wagon.

The accompanying cut shows an electric automobile mail wagon that has recently been tested in Berlin. The power is applied to the forward wheels, which in this case are both driving and steering wheels.



A GERMAN MAIL WAGON.

half-burned petroleum compounds, which they leave behind, like the trail of an evil comet. One difficulty that stands in the way of the adoption of alcohol motors in the United States is the stringent internal revenue regulation, which taxes that ma-

The batteries are contained in the box beneath the wagon body. The space in the wagon is not encumbered in any way by the mechanism. In addition to the interior the roof is arranged to carry a considerable quantity of mail.

### French Automobilmism in 1899.

From its birth the French automobile industry has advanced by leaps and bounds, quite overshadowing in the rapidity of its growth the records achieved by many of France's largest and most important trades, and to-day even threatening to take precedence of all, at no far-distant date, as the premier industry of the country. Any opposition that it met with in the earlier days has long since been swept aside by the irresistible current of public opinion, fostered by a legislation well disposed towards the industry and a press practically unanimous in its support. Without experiencing any set-back of a serious nature, the industry had continued unfalteringly its rapid forward march until the beginning of 1899, and in reviewing the record of the past twelve months even the most ardent and impatient advocate of automobilism cannot be otherwise than satisfied with the progress made, both from an industrial and a sportive point of view, for it is a progress even more marked than that of any previous year.

The general public may not entirely realize the magnitude of the advancement made from an industrial point of view, but for one who has occasion to continually visit the establishments of those engaged in this great business, the change effected in the condition of affairs during the last twelve months is truly remarkable. Progress is seen in every direction. Very many of the old-fashioned manufacturing concerns now possess large works, and all of them, certainly, have increased facilities of construction, thus commanding a correspondingly greater output than they had a year ago. Numbers of entirely new associations have entered the ranks of automobile constructors, and the bustle and activity in their factories betoken no lack of orders. Cycle manufacturers and carriage builders, especially, have not been slow to realize the possibilities of the new industry, and to-day one would experience difficulty in finding a firm in either of the two trades which has no interest in automobilism. Several of the leading carriage-building firms have enlarged their factories or allotted increased space to the automobile branch of their business during the past year. Indeed, the old-time aspect of several establishments has now completely changed for that of an engineering shop. And, keeping pace with these increased facilities for construction, greater attention has been bestowed upon the all-important question of design, and one has now an infinitely larger selection of handsome types of vehicles to choose from than was the case twelve months ago.

The excellency, too, of workmanship is quite on a par with the beauty of design. Since the commencement of 1899, the employment of aluminium and partinium in the construction of bodies for the better classes of automobiles has become universal, and a very great saving of weight has been effected. So much for the carriage

builders. The spread of the industry among cycle manufacturers has been of even greater extent. Large firms, small firms, companies, and societies, all have their interest in the movement, and seek to find in it an augmentation of the revenue so sadly diminished by the depression in their own particular trade.

Turning from the growth of the industry, let us look for a moment at the vehicles themselves. Are they better designed and more reliable than those which were making their initial runs in January, 1899? Are they more perfect in conception and better finished than their predecessors of a year ago? There can be no doubt about it. Certainly 1899 has not been a year of sweeping improvements in the mechanical details of the vehicles produced, but the improvements that have been effected are sound and substantial, and generally speaking follow the lines of those that have gone before. New systems in plenty have been placed upon the market, but they follow existing principles, and the revolutionary vehicle destined to supersede all types still lurks in the background.

The mechanical progress made during the year has had, however, the effect of very materially increasing the safety and reliability of the automobile, whether it be a racer or a tourist, or whether it be propelled by steam, oil, or electricity. The fear of being frequently en panne need not trouble the mind of the hesitating purchaser, for, given care and attention, his car will but seldom, if indeed ever, play him false.

The public demand for the voiturette has been one of the features of 1899, and certainly more attention has been given by manufacturers to the production of a small, light carriage than to any other type of vehicle. The Tuileries exhibition demonstrated the manufacturers' knowledge of the trend of the public's taste, for voiturettes were to be seen everywhere, and if any proof were wanting the Salon du Cycle at the close of the year afforded it. Here one saw every conceivable type of small car. Given a reliable and stylish little vehicle, with two seats side by side, and selling at a price not greatly in excess of that at present charged for a quadricycle, one would speedily see the extinction of the latter class of automobile.

From the industrial let us turn to the sportive side of the question and see what has been done in the past year. Expressed briefly, the racing automobiles of to-day are capable of ascending grades averaging 8 per cent. at a speed not greatly inferior, and in one category even superior, to that at which they travelled on the level a year ago. On December 18th, 1898, a series of speed trials took place over a level kilometre course at Acheres, while on December 3d, 1899, a race took place at Gaillon over a similar distance but mounting an average grade of 8 per cent. The time made by Rigal, who won in the motor-cycle section of the 1898

race, was 1 min. 20 2-5 sec. Villemain, in 1899, ascended the kilometre of hill in 1 min. 16 1-5 sec! In 1898 Marot, mounted on a touring motor-cycle, made 1 min. 42 2-5 sec. over the Acheres course, and in 1899 Bardin, on a similar type of machine, mounted Gaillon in 1 min. 36 4-5 sec. At Gaillon, the Vallee car beat by over a minute the time made by the racer of M. Lefebvre, which had previously bettered the record made by the winning car at Acheres on the level. No, the enormous increase of speed obtained during the past year cannot be doubled, for in every race during the season exceptionally fast figures have been set up.

One other feature of the year has been the tremendous increase of members of the automobile clubs already established, and the large number of provincial clubs which have sprung into existence. These latter are doing good work by popularizing the sport in different parts of the country, and over all there reigns supreme the "A.C.F." with its ever-increasing roll of members, and its far-reaching power.

Automobilism in France has progressed in 1899!—Motor Car Journal.

### Automobile Standardization.

There is no doubt that in a young and new art, standardization may be pushed too vigorously and too far, but it is evident that in many branches of electricity the time has arrived when uniformity should be arrived at and can be attained. Telegraph apparatus is fairly well standardized and even telephony, with all the heterogeneity introduced into it by the growth of the independent movement, tends irresistibly toward standard types and methods. The work that has been done and is still under way in lighting, power and traction, is too familiar to need recapitulation, and standards in those fields meet us in every direction, while no one can complain of any curtailment of freedom. It is better for all that there should be a 110 voltage than 110 different voltages. In the electric automobile field the tendency even thus early is happily making itself manifest. One might almost say that 44 cells of storage battery, with all that follows, had already become firmly settled as the standard and unit. But when it comes to charging or to change of batteries, it is obviously necessary that battery boxes should be standardized, that charging plugs should be "universal," and that every charging plant or plant available for charging should be equally useful and accessible to every vehicle that comes along and needs "juice."—The Electrical World.

Henri Fournier has sailed for Europe, where he will ride the Waltham company's motor vehicles. The first race he will enter will probably be the Nice-Marseilles race promoted by the Automobile Club of France.



**A Steam Mail Wagon.**

The mail wagon illustrated herewith was built by the Lancashire Steam Motor Co. of Leyland, England. It has been shipped to Colombo, Ceylon, for use by the postal service at that place. It is built to carry a ton of mail matter at an average speed of ten miles an hour on ordinary roads. The wagon came up to the requirements of the department as shown by the tests that were made by the government engineers



A STEAM MAIL WAGON.

previous to its being accepted. The general plan of the mail wagon is best shown by the illustration.

**An Expert at Concealment.**

A patent on a design for an automobile issued last month to Mr. Elmer A. Sperry, the automobile expert of the Cleveland Machine Screw Co., shows how adept he has become in concealing storage battery cells about a carriage body. Tipping forward the seat brings to view a part of the battery equipment. Opening a point in the body discloses another section of cells, and when these are moved forward still another section of cells is brought to view below. A hollow dashboard affords a place for other parts of the electrical equipment.

**The Steam Plows.**

The use of mechanically propelled implements in agricultural work is not a novelty on the large estates such as are to be found in the middle west and in other countries to the south. Where large tracts are to be plowed in a short season, and to be harvested in an equally short time, mechanical propulsion has been used to great advantage during the past ten years. An outfit, such as is shown in the accompanying

are raised from the ground by power from the engine, and in turning corners, etc., all the earth is turned. Any depth up to nine inches is plowed. Each plow is held by a wooden pin, which is a safeguard should it strike a hidden stone or root.

This outfit was built by the Geiser Manufacturing Co., of Waynesboro, Pa.

**Automobiles for Artillery.**

Newspaper correspondents have at length discovered that the employment of motors instead of horses for dragging artillery into action would have prevented the Tugela disaster, and would enable the guns to be taken much nearer the enemy, there being no horses to be killed. This is a point which cannot be too often repeated, and although it is perhaps too late to hope that the War Office will make the venture in the present war, we hope the military authorities will ere long consider the matter. The uses of the automobile in warfare are really illimitable, and while it has hitherto been regarded almost wholly in connection with the ammunition column and the commissariat department, there is no doubt it will render its greatest service in connection with artillery, enabling shorter ranges to be taken, and conducting to the mobility of the general force. We are glad to see the subject has been mentioned in the correspondence on transport in South African now going on in the columns of the Times.—Motor Car Journal.

"Say! Can you tell me," said a mild-mannered woman, past middle-age, at the cycle show, "Where that motor is, that you can put on any buggy? It only costs seventy-five dollars they tell me, and I would like to see it. I read about it in the papers, and they said it was here. I've got my buggy yet, but haven't bought a horse since my old man died. But I've kind a got the notion that this motor is just what I want. I never set much store by a horse any how, and would rather have a motor if its as they say it is. It would be a sight less trouble than a horse. You hain't seen it? No? Well, they told me it's here, and that's what I come down for."



THE STEAM PLOWS.

### Automobiles and Electric-Power Plants in Sweden.

Many business men here think that the import of motor carriages into Sweden, if once properly started, will be considerable, provided they can be made durable, neat in appearance, safe and easy to handle, and not too expensive. Cab owners, especially in Stockholm, are considering the advisability of purchasing motor carriages, and a short time ago they sent experts to Berlin to study and examine motor cabs manufactured in Germany. The report they made on their return was not altogether favorable. They said that automobiles which in catalogues seemed to be ideals of perfection in reality did not come up to expectations.

The chief objection to the motor cabs, with accumulators of storage batteries, was that they could not make sharp enough turns. The cabs were built with the batteries placed close to the back wheels. The steering power of the front wheels was so small that the carriages could turn only in very large curves, making them unfit for use on narrow streets. Another inconvenience was that as soon as the cabs got on a road covered with a layer of sand an inch thick, they stopped helplessly.

Besides these inconveniences, common to French and German motor cabs alike, it was said that few of the carriages exhibited were of the type desired—that is, with room for from two to four passengers. Hunting wagons, motor cycles, delivery wagons, etc., for sportsmen and business houses were plentiful; but cabs were fewer and, as a rule, clumsy in appearance. A German manufacturer promised, however, to remedy the faults mentioned; but it is not generally known whether the prospective purchasers and the manufacturer can agree on terms. Manufacturers of motor carriages usually demand one-fourth of the price for thirty days' trial; while the cab owners in question desire free trial before purchase, because they are unwilling to buy such expensive machines without being sure that they are practically useful.

At present, there is only a petroleum-motor carriage and a light motor cycle in Gothenburg, both of French manufacture. I believe there is an American motor carriage in Stockholm; but the American manufacturers ought to pay attention, also, to the markets in the other cities of this Kingdom, especially Gothenburg and Malmö. It would be of great advantage for American firms to be represented here at once.

Another thing of importance is electrical machinery in general, which will be in great demand as soon as the people have fully learned the value of their numerous waterfalls. A large electric-power plant will soon be built at Trollhattan; electric railways and tramways are being planned for Gothenburg, Lund, Björro, and Jonköping. In this line, as in everything else, the Germans are always watchful; they pay

close attention to details, and, if necessary, send experts here to study plans, etc., whereby they greatly increase their chances to introduce machinery. If it is not practical for Americans to do likewise, they could possibly employ active agents to represent them here.

Electric-motor carriages are preferred for city traffic. Those with benzine motors are said to be noisy and to emit offensive gases.

Robert S. S. Bergh, Consul.

### Notes.

Brookline, like Brussels, requires all self-propelled vehicles to be conspicuously tagged before entering its precincts.

Automobiles have been excluded from Forest Hill cemetery, Boston. A notice posted at the entrance announces the fact.

M. P. Hospitalier received recently the one hundred thousandth membership ticket issued by the Touring Club of France.

For the international race to be held in June next Charron, the French competitor, has ordered an automobile that is to cost seven thousand dollars.

An automobile livery service is to be established in Milwaukee by the Wood's Motor Vehicle Co., of Wisconsin, a company recently incorporated.

M. Schwess has reached Hong Kong from which place he will journey by automobile to Paris. The vehicle used is propelled by a gasoline motor.

Mr. A. L. Moore, president of the Cleveland Machine Screw Co., is now in Europe in the interests of his company. A handsome lot of automobiles are to be exhibited at the Paris Exposition.

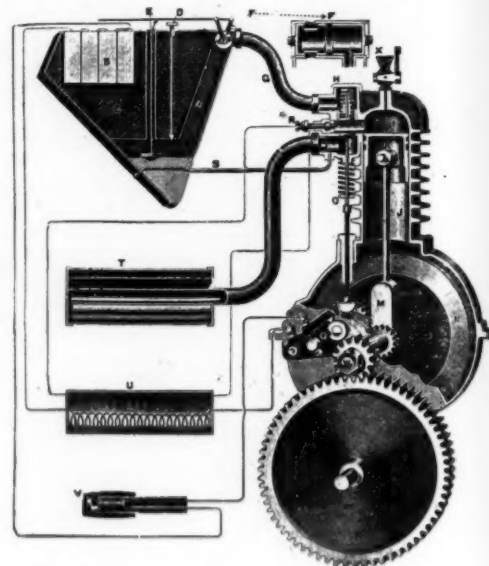
An automobile delivery wagon that has been attracting considerable attention on the streets of Cleveland, Ohio, belongs to the piano dealers, B. Dreher's Sons Co. It is fitted with Willard storage batteries and two 3½-horse-power electric motors, and is from the Wood's Motor Vehicle Co., of Chicago.

The motor cycle is an object of interest at a number of department and cycle stores. It is a drawing card to visitors. Were builders able to turn out a sufficient number to supply orders, more would be found at the stores. John Wanamaker has in his Philadelphia store a line of General Electric automobiles.

The automobile cabs that were placed in service in Paris, France, by the Compagnie Generale des Voitures about a year ago and withdrawn after a short time, are to be again offered for public hire. A few cabs are already out, and within two months sixty private and fifty public cabs will be in service. The motive mechanism of these cabs, it is said, has been greatly improved recently. These cabs will run thirty miles on a single charge of the battery.

### The De Dion Motor.

The accompanying cut shows diagrammatically the form of De Dion motor used by an English company on its tricycles and quadricycles. The more interesting feature of this equipment is the arrangement of the various parts of the apparatus. In the one piece suspended from the upper



- |  |   |
|--|---|
| A. Carburetor.   | L. Connecting rod.                      |
| B. Battery.  | M. Crank.                               |
| C. Spare tank.   | N. Flywheel.                            |
| D. Needle valve for feeding carburetor.                              | O. Exhaust valve.                       |
| E. Indicating wire to show height of petrol in carburetor.           | P. Cam for lifting exhaust valve.       |
| F. Mixing chamber comprising vapour and air valves.                  | Q. Contact breaker for sparking.        |
| G. Tube through which mixture passes into motor through inlet valve. | R. Sparking plug for igniting mixture.  |
| H. Mixture inlet valve.  | S. Tube to warm petrol.                 |
| I. Combustion chamber.   | T. Silencer to deaden noise of exhaust. |
| J. Cylinder.   | U. Induction coil.                      |
| K. Piston.   | V. Handle-bar switch.                   |
|  | W. Driving pinion.                      |
|  | X. Compression tap.                     |

part of frame there is contained the battery, the fuel tank and carburetor. The switch is in the handle bar and the muffler and coil are located near motor on rear part of frame. This style of motor is probably one of the most popular in use at the present time.

### News of the Trade.

The Eastern office of the Diamond Rubber Co. is at 127 Duane street, New York.

Morgan & Wright, Chicago, have opened a New York branch at 214 West 47th street, with Mr. W. C. Marvin in charge.

The Elgin Automobile Co. has joined the automobile quarter on Wabash Ave., Chicago, and will have very fine display rooms at No. 325 as soon as they are remodeled.

Mr. J. A. Blaurock, of the International Automobile & Vehicle Tire Co., is at present in Paris, where he expects to remain several months in the interests of the company.

The Goodyear Tire & Rubber Co., of Akron, O., reports that its automobile tires have met with such success that a new building will be necessary in the spring in order to supply the demand.

The Consolidated Rubber Tire Co. has declared a third quarterly dividend on its preferred stock of \$4,000,000. Mr. Isaac L. Rice was elected president last month to succeed Emerson McMillan.

In automobile red appears the new catalogue of the Winton Motor Carriage Co., of Cleveland, O. It is very neatly gotten up and shows the standard styles of Winton vehicles, one and two-seated carriages, delivery wagons, etc.

A very ingenious "expansion" circular, "not politics, but business," has been received from the Globe Iron Works Co., of Minneapolis, Minn. The subject of the folder is the White gasoline engine for launches. A more complete catalogue is issued to those desiring more complete information.

### THE SPORTSMEN'S SHOW.

The sportsmen's show opens March 1st, and continues two weeks, at Madison Square Garden. Besides the exhibits and displays of sportsmen's goods, there will be interesting programs and displays of relics and trophies taken by noted sportsmen. This show promises to be well attended.



**Bevin Automobile Bell.**

The bell illustrated herewith has been designed especially for the automobile. Not the least of its good qualities is the ease with which it is attached to the automobile, at any point convenient for the pressure of the foot. A slight movement is all that is necessary to bring forth two distinct notes of different pitch and in perfect harmony. Its sound brings the senses



to cautious attention without being harsh and disagreeable.

In the construction of the bell there are no loose parts to rattle. The design is simple and compact. It is substantial and fills every requirement. The gongs are made of pure bell metal and are full nickel-plated. Its shape is such as to afford no lodging place for dust or dirt. This bell is manufactured by Bevin Bros. Mfg. Co., of East Hampton, Conn.

**Trade Notes.**

One of the factories formerly occupied by the Overman Wheel Co. at Chicopee Falls, Mass., was recently sold to the Stevens Arms & Tool Co.

The Baker Motor-Vehicle Co., of Cleveland, O., has taken possession of its new factory on Jessie St., where it will soon have machinery in shape to turn out automobiles in quantity.

Among new companies incorporated for the building of automobiles are: The International Automobile Construction Co., at Portland, Me.; The Shaw Motor-Vehicle Co., at Portland, Me.; and The American Vehicle Co., of New York, under the laws of West Virginia.

The Hill, Whitney & Wood Co., of Waltham, Mass., report many orders for automobile parts of cast aluminum. This company makes to order from designs furnished, and such designs are held in strict confidence. Anything in the aluminum line can be had from this company, which also manufactures an extensive line of aluminum goods.

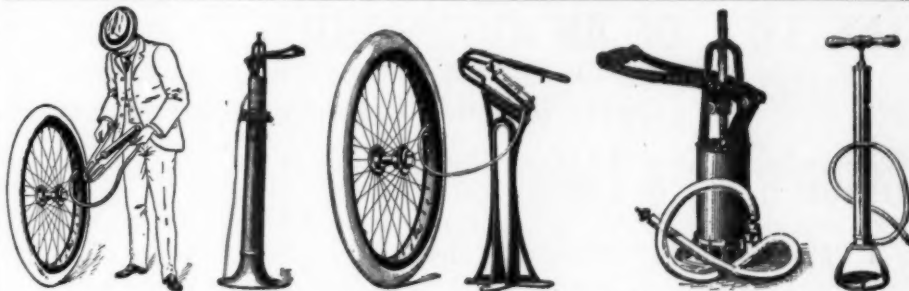
The new factory extension of the Daimler Mfg. Co., Long Island City, is completed and the first complete automobile will be out in about 60 days. Two hundred men will be employed in this department. Gasoline automobiles will be built, and a specialty will be made of delivery wagons.

The Porter Motor Co., of Boston, has recently secured a factory building, which will be equipped immediately with modern machinery for the construction of automobiles. The automobile of the company is propelled by steam, and its operation is said to be automatic. One of the novel features is the aluminum body.

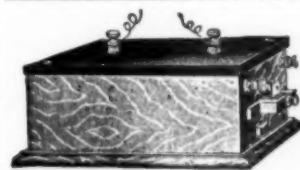
Among recent incorporations is that of the National Automobile & Electric Co., of Indianapolis, Ind. The capital stock is \$250,000, of which \$100,000 is preferred stock. The incorporators are L. S. Dow, Albert E. Metzger, Arthur C. Newby, Philip Goetz, Chas. E. Test, Robert Martindale and H. T. Hearsey. It is reported that ground has been purchased where a factory will be erected for the construction of automobiles. The specifications for these buildings call for the

**Wagon Bodies**

J. P. Sjöberg &amp; Co.

145-147 Eleventh Ave.  
New York CityMade to Order for  
**Automobiles**

Five Pumps for makers and users of Automobiles and Pneumatic Vehicles.

**Gleason-Peters Air Pump Co.,** Houston and Mercer Streets,  
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Engine Igniter.Acknowledged by authorities to be the MOST  
UP-TO-DATE method of electric ignition. . .

Manufacturers of Electrical Specialties.

**C. F. SPLITDORF, 25 Vandewater St., NEW YORK.**

completion of the buildings within ninety days after the signing of the contract.

For the purpose of introducing automobiles in Milwaukee and other cities of Wisconsin, the Wood's Motor-Vehicle Co. of Wisconsin, was recently incorporated. The capital stock is \$100,000; the President, Frank R. Bacon; Treasurer, F. L. Pierce, and Secretary, N. S. Hopkins.

The Kidder Motor-Vehicle Co. has secured the factory on Audubon St., in New Haven, Conn., formerly occupied by the New Haven Chair Co. The work of installing the machinery and renovating the building has commenced, and the company will shortly be in a position to fill orders.

The Autocar Co., of Pittsburg, is getting ready to move into its new works at Ardmore, Pa., which is just out of Philadelphia. The company has recently announced an advance in the price of its standard vehicles. The automobile previously quoted at \$500 now sells at \$650. The advance in the prices of raw materials and labor are responsible for this change in price.

The Automobile Company of America is getting its machinery in place in its new factory at Marion, Jersey City, N. J., and expects to have everything in full running order the latter part of March. The company will have its principal business office at the factory, with showroom in New York City, the location of which will be uptown. A number of new styles of vehicles will soon be ready. The company is now undertaking deliveries within sixty days.

The American Electric Vehicle Co. has just moved into new and handsomely appointed offices at 134 W. 35th street, near Broadway, New York. In connection with the offices is a repository, at which samples of the various types of vehicles manufactured by the company will be kept on exhibition for intending buyers. Facilities are also afforded for charging customers' batteries. Above the top of the building is an electric sign, very conspicuous at night, the letters of the sign being four feet in height. It is claimed to be the first electric sign of this kind to be used by an automobile company for such purpose. The company has completed the equipment of its factory at Hoboken, N. J., with new machinery, and is now in active operation. This is noteworthy when it is considered that the company moved from Chicago and commenced the work of fitting up January 1st. A large number of parts are being made and the first vehicle from these works will be turned out May 1st. The factory building is four stories high, and there has been added a blacksmith and forging shop. It embraces 60,000 square feet of floor space, and 200 men will soon be at work. Mr. C. E. Corrigan, the vice-president and general manager of the company, is known as one of the pioneers in the industry, and the company with which he is connected has built automobiles for several years. The factory is equipped with modern machinery and is prepared to do the work of building an electric automobile, including the battery and various parts. The woodworking department is equipped for making special designs to order.

**PROTECTING STRIPS.****FELT RIMS  
FOR  
PNEUMATIC TIRES.**

The annexed cut illustrates the application of a protecting strip on the edge of Rims as a protection to the Pneumatic Tire, preventing the wearing or cutting of the outer edge of the Tire.

Price list and particulars on application to the

**Colonial Automobile Co.,**  
32 Hawley St., Boston, Mass.

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Agents make big money, as liberal commissions are paid. Odd Times can be profitably spent if you cannot give your whole time to it.

Write for further information

**The Automobile,**

150 Nassau Street, New York.

**Financial.**

The Shelby Steel Tube Co. has recently absorbed several of the larger concerns, and as reorganized, is authorized to issue \$15,000,000 capital stock.

The reorganization of the Keating Wheel & Automobile Co. contemplates a plan whereby the creditors will be secured and working capital provided for continuing the business.

The annual meeting of the Pennsylvania Electric Vehicle Co. was held last month. The old Board of Directors was re-elected. The treasurer reported receipts \$20,851, and expenses \$19,653. The operating expenses were thus in excess of income \$1,198. Cash balance on hand is \$320,000.

## Automobile Charging and Repair Station

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**THE STORAGE BATTERY SUPPLY COMPANY,**

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**STREET RAILWAY DIRECTORY**  
**ELECTRICAL TRADES DIRECTORY**

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150 Nassau St., New York.

### Patents.

Lists of Automobile patents granted during month of February.

- 641,844—A Combined Driving and Steering Axle. Issued to J. H. Bullard.
- 641,727—Hydrocarbon Motor or Engine. Issued to Robertson & Matson.
- 642,051—A Pneumatic Tire for Vehicles. Issued to J. J. McDonald.
- 641,735—A Tire for Vehicle Wheels. Issued to H. W. Theis.
- 641,945—Running Gear for Vehicles. Issued to G. W. Farrell.
- 641,736—Wheel for Vehicles. Issued to W. F. Thomas.
- 642,143—Explosive Engine. Issued to T. Malcomson.
- 642,405—A Differential Gear. Issued to W. Senior.
- 642,274—Magnetic Brake. Issued to T. von Zweigberg.
- 642,513—Rubber Tire for Vehicles.
- 642,348—Pneumatic Vehicle Tire. Issued to A. H. Marks.
- 642,189—Wheel Tire. Issued to H. A. Whiting.
- 642,429—Means for Securing Pneumatic Tires on Wheel Rims. Issued to A. T. Collier.
- 32,179—Design for Vehicle Axle. Issued to Maxim & Alden.
- 32,161—Design for Battery Electrode. Issued to W. F. Richards.
- 32,182—Design for a Coupling Bar for Ends of Interior Securing Bands for Rubber Tires. Issued to G. Meyer.
- 642,777—Autotruck Wheel. Issued to J. C. Anderson.
- 642,720—Axle and Bearing. Issued to A. J. Robertson.
- 642,575—Roller Bearing. Issued to Boty & Moreau.
- 642,949—Explosive Engine. Issued to Baillie & Varsity.
- 643,087—Electric Generator for Sparking Gas Engines. Issued to D. Drawbaugh.
- 643,002—Electric Ignitor for Explosive Engine. Issued to Perkins & Blomstrom.
- 642,771—Motor Vehicle. Issued to G. E. Whitney.
- 642,943—Motor Vehicle. Issued to Whitney & Howard.
- 642,980—Vehicle Wheel. Issued to H. P. Handy, Sr.
- 32,198—Design for an Automobile Body. Issued to C. R. Harris.
- 32,199—Design for Motor-Vehicle Frame. Issued to J. Rittenhouse.
- 643,370—Fender for Automobiles. Issued to C. E. Belcher.
- 643,595—Gearing for Automobile Vehicles. Issued to L. H. Dyer.
- 643,122—Roller Bearing. Issued to H. B. Gillette.
- 643,397—Carburetter. Issued to S. Broichans.
- 643,306—Carburetter. Issued to V. J. A. Rey.
- 643,257—Automobile. Issued to E. A. Sperry.
- 643,429—Pneumatic Tire. Issued to A. A. Wade.
- 643,357—Rubber Tire Setting Apparatus. Issued to G. W. Keller.
- 643,440—Wheel for Vehicles. Issued to L. H. Ziegler.

### FOR SALE.

Winton Motor Phaeton, in perfect condition. I have two, only need one, and will sell the other. Address "M. P.," care THE AUTOMOBILE, New York.

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For Motor Vehicles and Street Cars.  
Received the Highest Award at the American Institute. Stands highly recommended by The Press. Is Reliable, Durable and Ornamental. Cannot be damaged through collisions. Fenders, Manufacturing Rights or Patents for sale. For full particulars, address  
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Cor. Thirteenth and Hudson Streets.

A display of English automobiles was made at Fifth avenue and 27th street, last week, in which there were seven machines of types that are not familiar here. They included a victoria, a couple of curious 'buses, a brougham, a dos-a-dos, a brake, and a char-a-banc that at a pinch will seat 20 persons. The vehicles all have gasoline motors, wooden wheels and solid tires. They are heavier and bulkier than the automobiles made here, but have a thoroughly made and business-like look that is impressive. The largest vehicle and all the others, excepting one which has an internal gear, are chain driven. They have all been imported by the Anglo-American Rapid Vehicle Co., of which W. W. Gibbs, of Philadelphia, is president; while Francis D. Carley, of this city, is vice-president.

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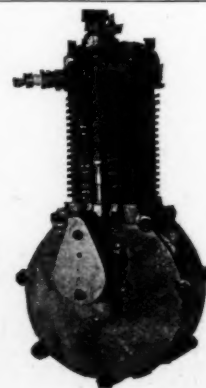
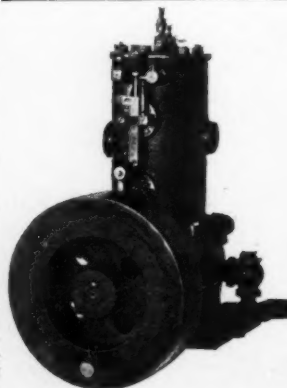
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"Horseless Vehicles, Automobiles and Motor-Cycles, Operated by Steam, Hydro-Carbon, Electric and Pneumatic Motors," by Mr. Gardner D. Hiscox, is the title of a new book now on the press. Will prove of great value to all interested in the construction or use of the self-propelled vehicle. 365 pages, 270 illustrations, large octavo. Price, postpaid, \$3.00.

"Gas Engine Construction," by Henry V. A. Parsell and Arthur J. Weed, is another new book soon to be out. It will be a practical book, giving working drawings and various details of these engines. Price, postpaid, \$2.50.

The United States patents relating to automobiles from the year 1789 to July 1, 1890, are being compiled by Mr. James T. Allen, examiner of the United States Patent Office. These patents number about one thousand. The reproduction of the drawings of these patents is a mammoth undertaking, which is nearly completed, and the work will be out and ready for delivery in a few weeks. The price of this work will be \$25.00. The publishers of THE AUTOMOBILE will receive subscriptions to this work, and it will be sent postpaid at the above price as soon as issued.

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